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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,204	09/18/2001	Richard Malcolm Kelso	P21154	6189
7055	7590	12/04/2003	EXAMINER	
GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191			SORKIN, DAVID L	

ART UNIT	PAPER NUMBER
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1723

DATE MAILED: 12/04/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Interview Summary</b>	Application No.	Applicant(s)
	09/857,204	KELSO ET AL.
	Examiner David L. Sorkin	Art Unit 1723

All participants (applicant, applicant's representative, PTO personnel):

(1) David L. Sorkin. (3) William Pieprz.  
 (2) Joshua Povsner. (4) \_\_\_\_\_.

Date of Interview: 20 November 2003.

Type: a) Telephonic b) Video Conference  
 c) Personal [copy given to: 1) applicant 2) applicant's representative]

Exhibit shown or demonstration conducted: d) Yes e) No.  
 If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 1 and 33.

Identification of prior art discussed: \_\_\_\_\_.

Agreement with respect to the claims f) was reached. g) was not reached. h) N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.



Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The interview focussed upon the recitation in claim 1 of "a fluid flow ... establishing a recirculating vortex system". The recitation in claim 33, "configured and positioned so that a fluid flow...establishes a recirculating vortex system" was also discussed to a lesser extent. Decisions were discussed, including *In re Casey* 152 USPQ 235, where it was held that "the manner or method in which such machine is to be utilized is not germane to the patentability of machine itself". The examiner expressed an opinion that, in an apparatus claim, regardless of the particular wording (i.e. for..., configured to..., adapted to..., whereby..., wherein... etc.), the most weight that should be given to acts/functions recited, is that the prior art be capable of being used to accomplish the acts/functions in the manner recited. (This would not be the case if section 112, sixth paragraph were properly invoked by reciting "means for...", however). Regarding the instant case, the examiner considers that the relied upon prior art is capable of being used as recited such that a fluid flow establishes a recirculating vortex system. For example, whereas turbulent flow necessitates the presence of vortices, and whereas sufficient velocity necessitates turbulent flow, one would need only input fluid at a sufficient velocity into the prior art devices to necessarily result in the "establishing" act/function referred to in the claims being achieved. It was agreed that "fluid" was not a required element of the apparatus. It was agreed that an apparatus may be within the scope of the instant claims even if fluid is not flowing and no vortex system is present. No agreement regarding the patentability of the claims discussed was reached. (Claims 10-19 are still considered to be directed to allowable subject matter).

A glossary mentioned by the examiner during the interview, obtained at [www.nas.nasa.gov](http://www.nas.nasa.gov), is attached which explains that in turbulent flow, vortices are necessarily present. Page 504 of Physics for Scientists and Engineers is also attached, but was not discussed in the interview, which explains that sufficient velocity necessarily causes turbulent flow.

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### Glossary

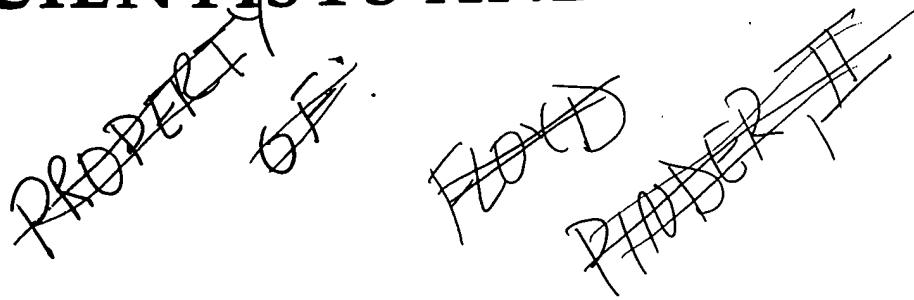
1. **Aerodynamics:** The study of the motion of gas on objects and the forces created.
2. **Airflow:** The movement of air around the chassis of the race car.
3. **Bernoulli Effect:** states that the pressure of a fluid (liquid or gas), decreases as the fluid (liquid or gas), flows faster.
4. **Carbon fiber:** Carbon based composite material, that is strong in tension but reasonably flexible. It can be bound in a matrix of plastic resin by heat, vacuum or pressure. It is strong, light and expensive.
5. **Cd:** Drag coefficient or coefficient of drag. It is determined by the shape and smoothness of shape of the object. In this case the car.
6. **Chassis:** Refers to all mechanical parts of the car attached to the structural frame.
7. **Computational Fluid Dynamics (CFD):** Equations that are known are programmed into computers. The computers provide solutions to the problem of external airflow over vehicle shapes. The body of the configuration and the space surrounding it are represented by clusters of points, lines and surfaces; equations are solved at these points. CFD is divided into three steps. Grid generation, numerical simulation and post-process analysis. Here are some examples of [CFD data sets](#).
8. **Downforce:** A vertical force directed downward, produced by airflow around an object. Downforce is generated from the front and rear wings and the venturi tunnels on a [ground effect car](#).
9. **Drag:** Force acting on an object in motion through a fluid (in this case air) in an opposite direction to the objects (chassis) motion, produced by friction.
10. **F-1 Race Car:** Formula One race car. A different type of race car racing under different rules and regulations. It weights 30% less than an Indy Car and has a flat bottom. Its physical appearance is very similar to that of an [Indy Car](#). The F-1 race car in action has a distinctive high pitch sound, particularly the [Ferrari V-12](#).
11. **Ground Effects:** Downforce created by a low pressure area between the underbody and the ground, and downforce created by the front and rear wings.
12. **Laminar:** Laminar flow means the fluid is moving in smooth layers around the object. Air flow becomes turbulent moving from the front to the rear of the car, forced around obstructions such as mirrors, helmets, and rollbars.
13. **Lift:** The upward reaction of an aircraft to the flow of air air forced over the shape of the wing (airfoil). The front and rear wings of ground effect cars are shaped like inverted wings to create downforce or negative lift.
14. **Monocoque:** A Body structure that derives its strength and rigidity from unitized construction, rather than a framework of thick members.
15. **Telemetry:** An electronic device which transmits specific data (measurements) to a remote site. It electronically records performance of engine and actuation of controls by the driver. The data is then used as a foundation for determining car setup.
16. **Turbulent:** Turbulent airflow is when the fluid streamlines break into eddies and complex changing patterns. This can cause unstable forces on an object. As the airflow moves from the front

17. **Turning Vane:** Deflectors located between the front wheels and sidepods to direct turbulent flow away from the tunnels. This eliminates a source of turbulent air to the tunnels. Cleaner air to the tunnels creates more downforce. Currently seen on most F-1 race cars, and on some Indy Cars.
18. **Venturi:** A narrow tunnel under the side pod, shaped like an inverted wing. As air enters and is forced through the narrow center, its speed increases, creating a low pressure area between the bottom of the car and the track. This creates a suction effect, which holds the car to the track.
19. **Venturi Effect:** Fluid speed increases when the fluid is forced through a narrow or restricted area. The increased speed results in a reduction in pressure. The underbody venturi is shaped to create a low pressure area between the road and chassis which creates downforce.
20. **Visualization:** Complex analysis tool that presents CFD data as an image. The image can exhibit surface pressure contours. This example shows fluid flow around complex geometries, using the Nordic ski jumper as the model.
21. **Vortex:** When a fluid rotates around its own center, it is called a vortex. Turbulent flow is made up of many little vortices.
22. **Wind Tunnel:** A tube like structure where wind is produced usually by a large fan to flow over the test object. The object is connected to instruments that measure and record aerodynamic forces that act upon it. The National Full-Scale Aerodynamic Complex located at Ames Research is the largest wind tunnel in the world. Included in this facility is the Unitary Plan Facility, the most heavily used wind tunnel in all of NASA. The Glenn L. Martin Wind Tunnel located at the University of Maryland, offers a broad range of testing applications from conventional aircraft to ground vehicles. Another type of "wind tunnel" is the computer generated Virtual Windtunnel. This expl

# PHYSICS

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## FOR SCIENTISTS AND ENGINEERS



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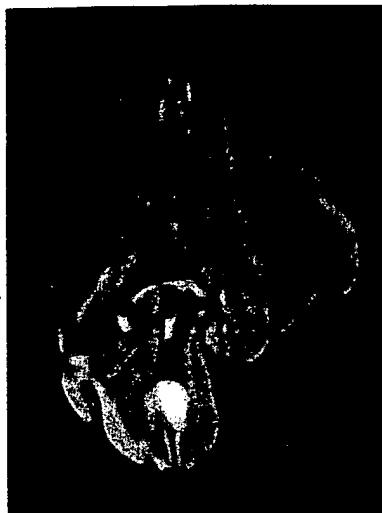
UNIVERSITY OF VIRGINIA

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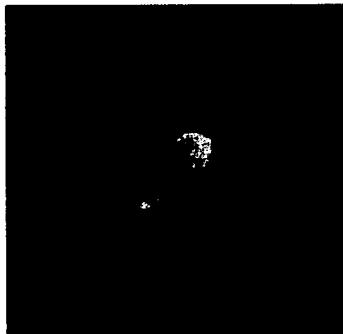


**PRENTICE HALL, Englewood Cliffs, New Jersey 07632**

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(a)



(b)



(c)

FIGURE 16-32 Turbulence, seen here in (a) the air above a candle, (b) the atmosphere of Venus, and (c) a jet exhaust, is an important feature of fluid flow.

### Turbulence

Viscosity enters into the definition of a dimensionless parameter that is associated with the onset of **turbulence**, a flow regime marked by violent and random movement, when the whole notion of neatly separated streamlines ceases to make sense (Fig. 16-32). This parameter is the **Reynolds number**,  $Re$ , defined as

$$Re = vL \left( \frac{\rho}{\eta} \right), \quad (16-31)$$

where  $\rho$  is the density of the fluid,  $v$  is its speed, and  $L$  is a length associated with the flow, such as the pipe's diameter for flow in a pipe. Note that  $Re$  is dimensionless, because

$$[Re] = \frac{[m \cdot s^{-1}][m][kg \cdot m^{-3}]}{[kg \cdot m^{-1} \cdot s^{-1}]}.$$

When the Reynolds number increases past about 2000 to 3000, the flow becomes turbulent. For water flowing through a pipe 1 cm in diameter,  $Re \approx (10^4 \text{ s/m})v$ , so the flow becomes turbulent when  $v$  reaches merely 0.3 m/s. This shows that the kind of flow we have treated in this chapter is not very common. Fortunately, a small amount of turbulence does not change the applicability of Bernoulli's equation for short distances of flow (just as a small amount of friction does not disturb energy conservation over short times), so Eq. (16-22), although not exact, is still a very good and useful approximation.

### SUMMARY

Liquids are distinguished from gases in that the molecules that form liquids are close together and impose strong forces on each other. Liquids are distinguished from solids in that the molecules in liquids do not form a rigid lattice. Both liquids and gases deform in response to shear forces and therefore flow as fluids. The density of a material of mass  $M$  and volume  $V$ ,

$$\rho = \frac{M}{V}, \quad (16-1)$$

is unchanging in incompressible fluids, which is the case for the fluids we study.